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ABSTRACT

The research reported in this document represents efforts to search for the structure and dynamics of the instructional process itself. Without reliable knowledge of these basic facts, improvement of teacher education and the guidance of teachers would remain based on unsystematic experiences and speculation. In order to penetrate the structure and dynamics of instructional processes, an instrument for the description of what is going on during the interaction, or a taxonomy for classification of observational data, is necessary. Different taxonomical procedures already developed were utilized for the description of instruction. This document describes a) the development of the instrument for the description of instructional processes, b) the taxonomy of the Helsinki Didactic Process Analysis project, and c) the aims and design of the project's second phase. (DDO)

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Matti Koskenniemi and Erkki Komulainen

INVESTIGATIONS INTO THE INSTRUCTIONAL PROCESS

X. Report of the DPA Helsinki, Phase One

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The series "Investigations into the Instructional Process", published in the Research Bulletin of the Institute of Education, University of Helsinki, includes nine reports by Matti Koskenniemi, Erkki Komulainen, Pentti Holopainen, Kai Karma and Marja Martikainen, in which some results of the research team DPA (short for Didactic Process Analysis) Helsinki have been reported.

The DPA Helsinki, which was begun in 1967, has now reached the end of its first phase which consisted in developing methods and instruments for description and analysis of instructional processes in natural settings. It is therefore appropriate at this point to summarize our findings and, especially, the frame of reference for continuing research into the instructional process.

DPA Helsinki has from its beginning been intimate team work. The following report is written by two of the team members but it is, in fact, a description of what we as a team have achieved. The other members of the team, Dr. Pertti Kansanen, Mr. Pentti Holopainen, Mr. Kai Karma, Mrs. Marja Martikainen, Miss Eeva Koskenniemi and Mr. Kari Uusikylä, have their share in the results reported in this paper. They will later give separate reports on certain special topics.

DPA Helsinki is indepted to the Nordic Cultural Foundation, The Academy of Finland, and the National Board of Schools in Finland for financial support. Cooperation with former and present teachers and pupils at the School of the Institute of Education has been qua non for these investigations. DPA Helsinki team expresses its sincerest gratitude to all these institutions and persons.

Institute of Education,
University of Helsinki,
January 1974

Matti Koskenniemi

Erkki Komulainen

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Investigations into the Instructional Process

X. Report of the DPA Helsinki, Phase One

1. Background of the DPA Helsinki Project

A follow-up study on the development of young elementary school teachers has been carried out at the Institute of Education, University of Helsinki from 1954 on in order to elucidate to what extent the entrance examination procedure used in teachers colleges was capable of picking up applicants with traits characteristic of successful in service teachers. The development of students in a teachers college was followed during their four years of study and during the three first years in service. Success in teaching as an independent teacher and adjustment to the school environment were used as criteria for the selection.

The efficiency in and adjustment to teaching were in this case studied by using observation-based ratings, focused on the question whether or not the teacher's actions - in the light of his own and his pupils' behavior and taking the circumstances into account - were appropriate from the point of view of the general educational aims set up. The instrument proved to be rather unsatisfactory because no research model representing the instructional process as a whole and including all the factors supposed to be of primary importance within this process was available. The description of the behavior of young teachers could not therefore be based on any theoretical frame within which observational data could be understood and explained. As a

consequence no clear suggestions for how to train student teachers in successful teaching and evaluate their instruction could be presented.

True enough, there were in the 50's hundreds of research results on behavior and personality of both successful and unsuccessful teachers at disposal. In these investigations, however, the fact that instruction is an interactive process had not been taken into account, and the results revealed no information about the structure of this interaction nor about the teacher's role in the process. This situation, mentioned in the main report of the follow-up study (Koskenniemi & al. 1965, 387-390), led to a decision to start a search for the structure and dynamics of the instructional process itself. Without reliable knowledge of these basic facts improvement of teacher education and the guidance of teachers would remain based on unsystematic experiences and pure speculations.

2. OPA Helsinki, Phase One: Aims, Procedure, Material

Penetration of the structure and dynamics of instructional processes requires an instrument for description of what is going on during the interaction, a taxonomy for classification of observational data. Owing to the lack of any theory holistic enough to provide a basis for building up such a taxonomical solution it was decided to make use of different taxonomical procedures already developed for description of instruction. It was assumed that, having at disposal a sample of various instructional situations representing different subject-matter contents and organizational forms of the teaching-learning process, and classifying them according to different taxonomical systems, it would be possible to find out invariances among various classifications both regarding situations as such and chains

of these situations within certain instructional periods, e.g., lessons or series of lessons.

Fortunately, at the time when the project was to be started, a number of such taxonomical systems for description of instruction were already available together with cumulated experience regarding their properties. Among these the systems of Flanders (1960; 1970), Bales (1950), and Bellack (1963) were found to be most relevant for our purposes, especially because the main target areas in these systems seemed to complete each other. Used together, these classifications were presumed to cover the most important aspects and events of the instructional process and, therefore, offer a possibility to seek the invariances mentioned above.

The proceedings of the conference, held in Toronto in 1967, "Next Steps in Research into the Teaching Process", published by Westbury and Bellack (1971), include a paper by Travers, "Some Further Reflections on the Nature of a Theory of Instruction" in which, i.a., the operational definitions of basic terms are taken up to discussion. In connection with those thoughts Gage (p. 43) offered an alternative solution to that proposed by Travers:

> 'Suppose we persuaded Flanders to observe in the same classrooms as those in which Cogan get the pupils to report and Ryans has his observers rate. And suppose we then found high positive correlations between these three operational definitions of reinforcing behavior. Then we would find that we could empirically equate these three operational definitions of the degree to which a teacher provides reinforcement, and we might call them indices of "warmth".'

On which Travers is reported to have replied:

> 'Yes, but nobody does this empirical operationalization.'

Information about methodological ideas in the area of classroom research seems to disseminate slowly. In 1967, when the DPA Helsinki research design was set up we had no knowledge of the Toronto conference, even though when we were so fortunate as to establish cooperation with a group of Scandinavian colleagues (in Malmoe, Gothenburg and Copen-

hagen). Neither was information about the Toronto conference and its discussions available, when the senior author of this report read a paper on "Principles in Building a Research Model for Empirical Investigation of the Instructional Process" at the Warsaw congress of 1969 (Koskenniemi 1969; 1970; 1971). Those proceedings did not come into our hands until 1972.

How the idea of triple classification of videotaped recordings was realized and with what results is described in the next paragraph. The material was collected from three elementary school classes (grades 3 and 4) at the Institute during the school years 1967-69, 1969-71 and 1971-73. To have only one class at a time as target was intended to minimize the variance caused by the teacher and background variables, and the same purpose was served by a rather low number of pupils in the classes (19 to 23).

Sampling of lessons for recording and taxonomical processing during Phase One was based on the following ideas (cf. Koskenniemi & Komulainen 1969, 8-9). The properties of teaching which have the strongest influence on the structure and flow of the instructional process were assumed to be:
1) the aims of instruction expressed in terms of contents,
2) the social structure of the class during the lesson, and
3) the division of labor and responsibility while working.
Efforts were therefore made to include different combinations of subcategories within each of these main properties in the material.

Such a sampling procedure could not be fully carried out, partly due to the fact that the taxonomies developed by Bellack and Flanders proved to be rather unsuitable for classification of situations belonging to other activity types than class instruction proper. The material collected during Phase One does, however, include a number of recordings of group work and assembly situations. To complete sampled lessons some material consisting of whole chains of lessons was

also collected.

3. Developing an Instrument for Description of Instructional Processes

3.1. The Idea of Making Comparisons between Taxonomies

A very comprehensive set of instructional taxonomies for various purposes has accumulated during the last two decades. In the volumes of "Mirrors for Behavior" (Simon & Boyer 1967; 1970a; 1970b) 92 different observational schemes were presented. It is very natural that difficulties arise when comparing information obtained in different ways and by different methods from instructional processes. Firstly, the systems have different theoretical backgrounds and sets of concepts. Secondly, the measurement procedure itself (coding of elementary units) is technically carried out in different ways, which affects the results of taxonomical procedures. It is quite evident that a universal and detailed instructional taxonomy cannot be constructed. It might, however, be realistic to think that the composition and joint use of procedures which have proved useful could produce an instrument, which could cover the most significant dimensions of instructional situations in a satisfactory manner. It is clear that we need specific category systems for specific purposes and problems. The relevance of specific systems is, however, often restricted, and they cannot be used as an instrument for general purposes in research on teaching at large.

The correspondence between the outcome of various classification systems has so far been the object of empirical study in very few investigations. Furst, in his unpublished doctoral thesis (1967a), made use of the typescripts provided by a team headed by Bellack. The material was recorded with FIAC by Furst. He used both FIAC and measures developed

by Bellack et al. (1966) to relate classroom behavior to pupil growth (cf. Furst 1967b; Westbury & Bellack 1971, 64-65).

Medley & Hill (1969) correlated variables composed from FIAC and OScAR 4 V. They selected variables which indicate clear differences between teachers. Although their study was mainly concerned with the structure of instruction, the factors were interpreted to have a certain dynamic content. Four of their ten varimax-rotated factors dealt with questions asked or answered, three described pupil talk and teacher's response to it, and another three were related to classroom management. Some of the factors received loadings of variables representing both taxonomies, some were determined solely by FIAC or OScAR variables.

The purpose of the research carried out by Wood et al. (1969) was to identify and define interrelationships between three observational instruments, each built to reflect classroom behavior from a different theoretical point of view. The instruments were:

(1) The Florida Taxonomy of Cognitive Behavior (FTCB);
(2) The Reciprocal Category System (RCS); and
(3) The Teacher Practices Observational Record (TPOR).

The subjects of the study comprised 117 teachers representing twelve grade levels (1-12) and ten different subject areas. Seventy variables derived from the instruments were subjected to a principal components factor analysis with varimax-rotation. The results are too detailed to be reviewed here. It may suffice to say that a relatively clear 12-factor structure suggests that while some reflective overlap exists among the instruments and between pairs of instruments, each retains a wide range of descriptive exclusivity (cf. Wood & al. 1969, Appendix, Table 2).

Factor analysis seems to have been the main statistical procedure in comparing the results of various observational instruments. What we learn from these analyses is that the composition of combined taxonomies cannot be accomplished

solely by empirical and statistical procedures. Such an attempt could hardly be fruitful. The task is basically one of logic and concept analysis but can, of course, be corroborated by the results yielded in such analyses.

The DPA Helsinki has during the period 1967-71 used three instruments: Flanders' Interaction Analysis (FIAC), the procedure of Bellack et al. and Bales' Interaction Process Analysis (IPA). Triple classification which has been carried out separately by independent coders, naturally raises the amount of work and costs. IPA has been coded partly from the units of Bellack (i.e., moves). FIAC codings have been performed separately, because they are not based on natural units but on time.

Our long-range goal was to melt the essence of each taxonomy into one multiple set of categories which could be based on the same units. One of the purposes was to discard the technical dependencies between category sets, so that their use in statistical analyses would be simplified. The results presented in the following sections have been calculated after composing the DPA taxonomy.

3.2. Material and Method

The material was videotaped in the laboratory class of the Institute of Education, University of Helsinki, during the academic years 1967-71.

Table 1. The Videotaped Lessons

Name of material	Years	Number of lessons	Number of moves coded by Bellack	Number of moves coded by IPA
A	67-69	96	37 085	37 085
B	69-71	78	22 805	16 381[1]

[1] The IPA codings of 54 lessons were based on Bellack moves. 24 lessons were coded with IPA's own unit - act - independently from Bellack. The total number of IPA acts in these 24 lessons was 10 195 compared to the amount of moves which numbered 6 424.

Table 1 shows that separate independent coding produces many more IPA acts than Bellack moves in the same lessons. Thus even the definition of the basic unit, which is the target of classification, considerably influences the outcome of classification.

FIAC-codings of the material above were done independently with a 13-category modification. This material consisted of only 25 lessons in material A (cf. Komulainen 1973). The lessons in material B were all classified with a 23-category FIAC version (cf. Flanders 1970, 140-141). Because of their specific nature the relationships of FIAC to other two taxonomies will be reported later. The fundamental dimension of Flanders' "teacher influence" is, however, included in the IPA instrument.

The relationships between IPA and Bellack can be analyzed in two different ways. Firstly, the joint move-by-move codings can be cross-tabulated. The total number of units is 37 085 in material A and 16 381 in material B. The spurious results caused by lack of objectivity in coding are quite effectively eliminated by the large number of units. Secondly, one can formulate variables (category totals, indices, ratios, etc.) from both classifications and then make a correlational analysis over situations (lessons) using a lesson as unit (row) in the data matrix. The information can subsequently be condensed through factor analysis. In the following two sections some details of the procedures are given[1].

[1] In this report we can only give a very concentrated illustration of the procedures and results. A huge amount of computer output - about 2500 pages - has been accumulated. The reader interested in details should address correspondence to the Institute of Education, University of Helsinki, Fabianinkatu 28, SF-00100 Helsinki 10, Finland.

3.2.1. Cross-tabulations

The unit used for analysis is a move. IPA coding was performed following the unitizing of Bellack. IPA coding was accomplished subsequently to Bellack coding by different coders. With both materials the same cross-tabulations were performed except that teacher and pupil moves were not separated in material B.

Table 2. Cross-tabulations performed

Number of analysis	Vertical direction in the analysis (columns)	Horizontal direction in the analysis (rows)
1	In each analysis 12-category IPA	Pedagogical moves[1]
2		Logical meanings
3		Instructional meanings
4		Rating and extralogical categories
5		Occurrence (yes/no) of substantive meanings

[1] A modification of original Bellack (cf. Karma 1972, 3-4).

3.2.2. Correlational Analysis

The unit in the data-matrix is a lesson. On the basis of both taxonomies variables were constructed which can roughly be divided into three groups:

(1) Profile variables which indicate the relative frequency of a category in a lesson (e.g., T/11 from IPA, or T/STR from Bellack).

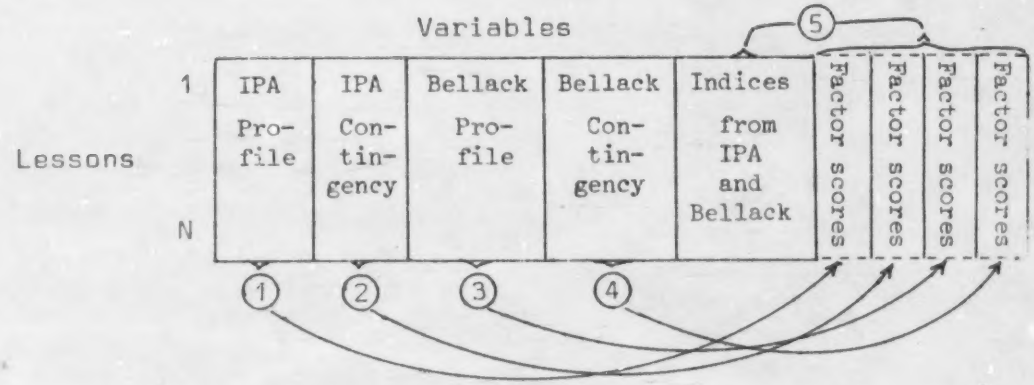
(2) Contingency variables which were formed from transition matrices calculated for both taxonomies (analogous to FIAC matrix) by picking up certain sequences as variables: e.g.,

from IPA T/3 followed by P/6, and from Bellack T/REA followed by P/STR.

(3) Indices. On the basis of both taxonomies certain ratios and various kinds of linear combinations deducible from profiles were composed, a procedure which is rather common when using Bales' IPA (cf. Mishler & Waxler 1968). For example, teacher tension release [(T/2 + T/11)/total] is an index commonly used. Such indices are, on the other hand, almost nonexistent in the Bellack system. We constructed here, on the basis of experience and leaning on logic, a number of indices: e.g., (STR/+)/[(STR/+)(+ STR/-)], (+ and - referring to the presence of substantive meanings in the move). Almost all indices were composed to have a range from 0 to 1.

The initial data matrix consisted of five groups of variables. Four groups on the left in Fig. 1 were analyzed independently. The fifth variable group was treated together with the factor-score variables[1] yielded in the preceding analyses.

Figure 1. Schematized Picture of the Data Matrix and Procedure



Circled number refers to the number of factor analysis

[1] Factor scores were estimated by the regression method.

The ipsativism of measurements is a difficult problem when multivariate techniques are applied to such data matrices. A category profile adds up to a constant, and the case is similar with the contingency variables. Almost any matrix can be factor-analyzed but only a few of the analyses may have any meaning. The question of ipsative data has been thoroughly discussed elsewhere (cf. Komulainen 1973, 18-20). In the interpretation of the results we have tried to limit the discussion to points that are not severely affected by this kind of artificial effect. Another problem arises when indices are used as variables (cf. McNemar 1962, 162-163). There is no way to remove the distortion of spurious correlations from factor analysis. It is, however, important that one is aware of these interferences. Professional judgement and extensive experience help to eliminate the influence of technical effects in the interpretation.

3.3. Summary of Main Results[1]

The analyses clearly reveal that the part played by artificial effects is greater in material A than in material B. This is explained by the growing experience of the coders to perform such a complicated task. In short, there are trends in the coding behavior (cf. Komulainen 1970) which have been leveled out and whose effects have been removed by randomizing the order of coding in material B. Thus, the major interest lies in the results of the B material. Of course, the possibility of cross-validation between materials has been taken into account.

The objectivity of coding was checked by independent re-coding of randomly chosen lessons. The range of overall reliability of IPA in material B varied between .65 and .92 (expressed in Scott's Π between category profiles) the median being .79. The level of reliability was quite similar

[1] Mrs. Marja Martikainen and Mr. Kai Karma have been helpful in writing this section.

in material A. The reliability of Bellack codings was as follows:

	range	median
- unitizing[1]	.57 - .79	.72
- moves[2]	.57 - .94	.91
- logical meanings	.52 - .88	.72
- instructional meanings	.38 - .67	.55
- rating and extralogical categories	.47 - .75	.61

[1] cf. Guetzkow 1950

[2] proportion of identical classifications per total number of units

The objectivity of Bellack was slightly lower in material A.

3.3.1. Summary of Cross-tabulations

Three tables are presented of the material where Bellack moves and IPA categories have been cross-tabulated.

The results are expected and logical. They support the division of SOL-move into five subcategories in the DPA taxonomy (see underlinings in Tables 3, 4 and 5). The fifth is a logical construction for the joint planning phase, where IPA category 9 is splitted into "asking directions" and "asking suggestions".

The socio-affective aspect of communication seems to be relatively independent of the type of move: see for example SOL/10 in Table 3. The general conclusion is that both category systems indicate different and complementary aspects of the teaching process.

Table 3. Cross-tabulation of Teacher Originated Acts from Material A (N = 21738)

Bellack moves	Bales categories 1	2	3	4	5	6	7	8	9	10	11	12	
STR	0.24	0.04	0.20	2.92	4.74	8.28	0.24	0.03	0.01	0.46	0.04	0.06	
SOL	0.17	0.03	0.31	18.93	0.68	1.32	15.83	3.64	0.23	2.74	0.10	0.40	
RES	0.03	0.00	0.61	1.41	0.55	2.98	0.10	0.00	0.01	0.47	0.03	0.04	
REA	0.90	0.19	16.79	1.83	3.60	4.84	0.29	0.03	0.01	3.68	0.06	0.16	Σ = 21738

Table 4. Cross-tabulation of Pupil Originated Acts from Material A (N = 15 348)

Bellack moves	Bales categories 1	2	3	4	5	6	7	8	9	10	11	12	
STR	0.13	0.26	0.30	0.40	7.81	3.97	0.28	0.06	0.79	0.84	1.86	0.80	
SOL	0.06	0.07	0.07	1.13	1.18	0.69	8.12	1.12	5.87	0.51	0.77	0.27	
RES	0.11	0.15	0.46	0.38	6.94	27.47	0.45	0.02	0.15	0.38	0.62	0.15	
REA	0.30	1.02	2.61	0.23	4.29	2.24	0.31	0.06	0.30	4.32	2.63	0.78	Σ = 15 348

Table 5. Cross-tabulation Performed in Material B with no T/P Distinction (N = 16 382)

Bellack moves	Bales categories 1	2	3	4	5	6	7	8	9	10	11	12	
STR	0.04	0.10	0.07	0.68	2.77	8.14	0.15	0.02	0.09	0.23	0.36	0.01	
SOL	0.05	0.09	0.11	11.41	0.26	0.84	14.39	2.37	2.11	1.39	0.32	0.23	
RES	0.00	0.08	0.16	1.14	3.19	16.53	0.16	0.00	0.03	0.20	0.09	0.01	
REA	0.92	1.01	14.58	0.82	3.03	3.68	0.25	0.04	0.03	2.42	0.67	0.16	Σ = 16 382

3.3.2. Condensed View on the Results of Factor Analyses

3.3.2.1. Technical Procedure

In the following the main characteristics of the analyses are presented. The method used was principal axis solution with varimax rotation. The multiple R between variables and the factor in question in estimating the factor scores reached unity in some cases indicating that the data matrix is a reduced rank matrix (cf. Cooley & Lohnes 1971, 59). This is due to the N/P-ratio. It is also clear that linear dependencies of technical nature, as mentioned earlier, affect the rank of the data matrix.

Table 6. Characteristics of Analyses

A	B	C	D	E	F
1	26	3.00	55.6	5	IPA-profile
2	76	1.03	48.5	6	IPA-contingency
3	74	1.05	43.0	3	Bellack-profile
4	19	4.11	41.5	2	Bellack-contingency
5	51	1.53	83.6	12	Factor-scores & IPA & Bellack indices

A = number of analysis
B = number of variables
C = N/P-ratio
D = percent of variance explained
E = number of factors rotated
F = nature of variables

The analyses to be reported are based on material B (material A was only used for comparison). The spurious correlations between variables caused the emergence of some factors which lacked any meaning. Such factors have been omitted in reporting.

3.3.2.2. Results

Analysis 1 produced the clearest interpretations among all analyses performed.

Factor I

P/9	.87	T/7	-.71
T/4	.72	P/6	-.66
P/4	.65	T/3	-.78

The positive pole of the factor is the management of activity. Pupils ask for directions, teacher gives directions and orders. The relative frequency of P/4 is very low.

The negative pole consists of elements teacher asking, pupil answering, teacher accepting. The emphasis is on subject matter in contrast to the positive pole.

Factor II

T/7	.53	T/8	-.83
P/6	.53	P/5	-.85

The positive pole consists of teacher asking information and pupil giving it (answering). Opposite to the positive pole is teacher asking opinions and explanations. This quality of the negative pole indicates a higher cognitive level of communication.

Factor III

P/3	.56
P/10	.69
P/11	.44
P/12	.69

The third factor is characterized by emotional pupil expressions. Both positive and negative reactions load on the same pole.

Factor IV		Factor V	
T/10	.70	T/1	.66
T/11	.70	T/2	.42
T/12	.65	T/3	.30

Negative emotional expressions of teacher all load on Factor IV while the positive expressions differentiate to their own factor. T/3 is not, however, represented by a high loading (see also Factor I). In most cases teacher category 3 does not involve positive emotionality. It is commonly used as a mild unemotional acceptance of some pupil performance. This is - although less obvious - also the case with teacher category 10.

Although the percentage of variance explained was rather high in Analysis 2 it hardly gives any new information. In this context analysis of category sequences does not give new information compared with the analysis based on relative frequences of categories.

Analysis 3

Factor I

T/REA	.89	T/ASG	-.77
P/RES	.76	T/PRF	-.67
T/ADM	.67		

The positive pole is similar to Factor I in Analysis 1. The absence of T/SOL is explained by complex content of this category. This supports the results obtained from cross-tabulations. The negative pole reflects teacher management in directing the activity and flow of lesson.

Factor II

SOL/-	.88	T/+	-.89
REA/-	.77	logical /+	-.79
OPN/-	.64	STR/+	-.78
FAC/-	.79		

This is a dimension of subject-centered vs. non-subject-centered quality lesson. The technical dependencies among variables emphasize the content of the factor.

Factor III

P	.91	T	-.83
P/REA	.72		
P/STR	.63		

This factor is a spontaneity factor where pupil initiative is contrasted to teacher talk.

Analysis 4

The sequence variables formed from Bellack did not reveal any significant aspect of teacher-pupil communication except the usual pattern ... T/SOL - P/RES - T/REA - T/SOL ... which is one of the persisting features of the traditional teacher-led instruction (cf. Hoetker 1968; Hoatker & Ahlbrand 1969).

Analysis 5

The analysis was done with factor score variables from previous analyses and indices formed separately from IPA and Bellack. Because the factor scores were on the whole uncorrelated, the number of extracted and interpreted factors was fairly large. Considerable correspondences existed between these factors and factors obtained earlier. Indices and factor scores did not form factors of their own but loaded on the same factors. Therefore only a summary of the main factors is presented in the following section.

3.3.2.3. Summary

In the following we refer to the number of factors although they have not all been interpreted and explained earlier. It should also be noted that some of the dimensions are bipolar, some are not.

Table 7. Summary of Corresponding Factors

Dimension description	Number of Analysis 1	2	3	4	5
1. Subject-matter centeredness	I	I, II	I	I	I, II
vs. action-centeredness	I	II	I	-	I, II
2. Teacher asking information	II	-	-	-	IV
vs. teacher asking opinions and explanations	II	-	-	-	IV
3. Pupil spontaneity	-	-	III	-	XI, XII
4. Subject relevancy	-	-	II	-	V
vs. non-subject relevancy	-	-	II	-	V
5. Pupil expressiveness	III	VI	-	-	VI, X
6. Teacher positive expressions	V	-	-	-	VI
7. Teacher negative expressions	IV	-	-	-	IX

The widely used IPA indices seem to be valid measures of the socio-emotional dimension in the classroom discourse. Bellack indices, however, need further examination.

4. The DPA Helsinki Taxonomy: An Presentation

4.1. Some Definitions

Our project has a frame of reference which, as is the case in investigations into the instructional processes in general, is determined by the definition embraced for the concept of instruction.

Instruction is seen as a mainly interactive process within school life, aiming at the development of the pupil's personality in accordance with educational objectives. The aims of school learning, derived from these objectives, are to be accepted by and internalized in at least most members of the class community. This presupposes joint decisions regarding the work of the next days or weeks. Consequently, the concept of the instructional process must include phases both before and after the interactive situations proper. Jackson (1962) has defined beforehand planning conducted by the teacher as "preactive phase of instruction". This kind of preparation should, however, comprise joint planning by the teacher and his class, too. Joint evaluation carried out after certain periods of study must also be considered an essential part of instruction.

Planning done by the teacher alone is in the DPA Helsinki project coined as the preinteractive phase of instruction. It is followed by joint planning which falls within the frame of the interactive phase proper, as does also joint evaluation. Evaluation conducted by the teacher alone is, again, defined as the postinteractive phase of instruction.

Instruction, especially during its interactive phase, consists of various instructional situations following each other or running alongside. These situations forming smaller temporal sections of a longer instructional period are distinguishable from each other by the way instructional activities are arranged or take place, e.g., by grouping of pupils, and by the division of responsibility (cf. Koskenniemi & Hälinen 1970, 101, 106).

4.2. Main Taxonomical Principles

Instructional periods (usually equivalent to lessons), i.e., temporarily limited, continuous sequences of instructional situations, are in our taxonomy described as processes within a frame of certain areas, each comprising several variables. The presentation which follows is short and does not include details of manual character. (An English version of the DPA Helsinki manual is to be published later.) It may, however, be mentioned that the taxonomy can be used for analysis of interactive phases of instruction on all age levels, irrespective of its modes and contents.

The description of an instructional period is composed of eight areas, assumed or empirically found to be relatively separated from each other. Tools for description are operationalized either by the definition of the instruction itself or by the empirical cross-validation reported in the preceding paragraph. The areas are

A Division of labor and responsibility and grouping grouping of pupils
B Formal characteristics of verbal communication
C Content (subject-matter) and its relevance for pupils
D Climate of the classroom
E Authority relationships
F Flexibility in behavior
G Pupils' participation
H Goal-related behavior

Descriptions are built up in the following way. Temporal units are first assorted from the flow of the instructional process. With slight modifications these units are identical with the pedagogical moves according to the Bellack system (STR, SOL, RES, REA, IRR, SIL). They are seen as natural units representing didactical functions on the tactical level. Units of this kind are preferred to artifically limited units based on time-sampling procedure which is applied in some other systems.

Each pedagogical move is, further, classified with regard to its cognitive content (FAC, XPL, OPN, PER, MAN;

modified Bellack categories), its social-affective characteristics (modified categories 1 to 4 and 9 to 12 of the Bales' system), and modes of teacher influence appearing in it (Flanders' categories 31 to 34, 61 to 63, and 70 slightly modified). We assume that the essential qualities of these smallest units of the instructional process are determined in this way.

An instructional period is, however, as a process more than the sum of the units of which it consists. It has holistic qualities (e.g., a certain emotional climate) or structural properties which can be described only by combining data from unit codings or by viewing the temporal chain of situations as a whole, from its beginning to its end. Description of whole periods of instruction is therefore in some cases built on the basis of unit classifications (by using combined indices), in some cases based on ratings or classifications concerning the period as such, and sometimes on the basis of both.

In the period coding within the eight areas mentioned above operationalization has been carried out in the following way:

A Division of labor and responsibility and grouping of pupils is expressed through the forms of classroom activities and their sequence: by giving the occurrence and distribution of teacher-centered, pupil-centered and cooperative activities during the lesson.

B Formal characteristics of verbal communication comprise indices for distribution of the pedagogical moves, share of teacher moves of total number of moves, share of pupils' REA moves of total number of pupil moves, and measures on cycle length. Further the distribution of categories expressing cognitive content of the moves is given, e.g., (separately for the teacher and pupils) share of PER, FAC+XPL+OPN, and MAN of total number of cognitive moves.

C Content is expressed by the subject-matter area characteristic of the lesson: means of communication; knowledge of surrounding reality; formal systems needed for mastering of reality; religious, moral and aesthetic value systems of culture; motor skills; or their combinations. Further indices of overt and covert attendance and interest of pupils during the period are given.

D Class climate is operationalized by some combined Bales' indices: e.g., distribution of all categories during the lesson, and ratios (teacher, pupils, teacher + pupils) between numbers of certain categories, and ratios between numbers of certain categories and total number of the moves.

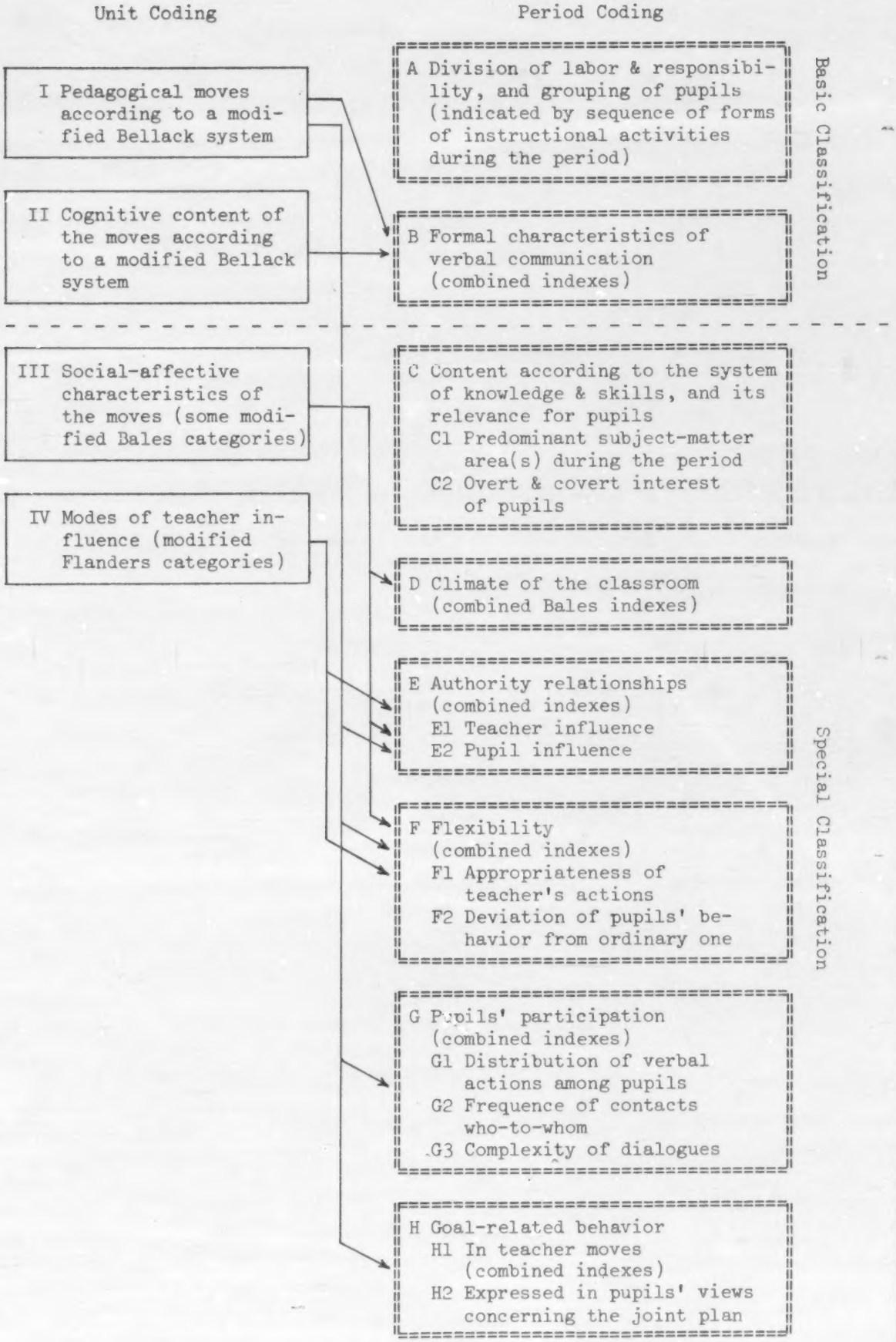
E Authority relationships are expressed as I/D ratios based on unit codings referring to modes of teacher behavior, and, as to the pupils, by pupil moves and affective meanings of these moves.

F Teacher flexibility is operationalized by the percentage of his/her actions appropriate to the situation at hand, and, as to the pupils, by the share of pupil moves deviating from their ordinary behavioral tendencies.

G Pupils' participation is operationalized by the distribution of verbal actions among pupils in the class during the lesson (very uneven, uneven, even), percentage of contacts pupil-to-teacher and pupil-to-pupil, and the number of longer and shorter dialogues picked up from cycles.

H Goal-related behavior is, as to the teacher, operationalized by the percentage of his/her moves attached to the plan. As to the pupils, it is expressed either through their ratings regarding their attitudes toward the plan, or through stimulated recall ratings. An operationalization by interpolative conclusions between data from planning session and the evaluative one is also to be used.

DPA HELSINKI TAXONOMY: AN OVERVIEW


Unit Coding
Period Coding
I Pedagogical moves according to a modified Bellack system
II Cognitive content of the moves according to a modified Bellack system
III Social-affective characteristics of the moves (some modified Bales categories)
IV Modes of teacher influence (modified Flanders categories)
A Division of labor & responsibility, and grouping of pupils (indicated by sequence of forms of instructional activities during the period)
B Formal characteristics of verbal communication (combined indexes)
C Content according to the system of knowledge & skills, and its relevance for pupils
C1 Predominant subject-matter area(s) during the period
C2 Overt & covert interest of pupils
D Climate of the classroom (combined Bales indexes)
E Authority relationships (combined indexes)
E1 Teacher influence
E2 Pupil influence
F Flexibility (combined indexes)
F1 Appropriateness of teacher's actions
F2 Deviation of pupils' behavior from ordinary one
G Pupils' participation (combined indexes)
G1 Distribution of verbal actions among pupils
G2 Frequence of contacts who-to-whom
G3 Complexity of dialogues
H Goal-related behavior
H1 In teacher moves (combined indexes)
H2 Expressed in pupils' views concerning the joint plan
Basic Classification
Special Classification

5. DPA Helsinki, Phase Two: Aims and Design

5.1. Methodological Considerations

In building research models for investigation of the instructional process different metaphors have been employed. As a rule, such models cannot be used for description and understanding of instructional situations of any kind: most of these models are suitable only for describing certain components of the process or certain activity forms under certain circumstances. Furthermore, the metaphors used are not always compatible with each other. There may, of course, be a possibility that they supplement each other and could therefore be combined into a more extensive model, supposing that they do not comprise incommensurable elements.

To what extent is a research model constructed for purposes of empirical investigations of help for an understanding of the structure and dynamics of different instructional situations? Only if it can be demonstrated that various instructional situations are sufficiently similar structurally and as regards the underlying principles of their dynamics, a single model can suffice. In other words, if we suppose that all such situations have common characteristics which are implicit in the definition of the instructional situation, in the sense that if these characteristics are not present, the process is no longer an instructional one.

This problem has been discussed elsewhere as regards the three main characteristics of the instructional process, i.e., aims, social structure, and content (Koskenniemi 1969). The conclusion reached was that there is, in principle, no arguments speaking against an attempt to seek a single model capable of describing the instructional process as a whole and including all the groups of elements which are supposed to be of primary importance.

The discussion concerning the strategy of classroom research reflects divergent standpoints. Only two extreme views shall be touched upon here. - Robert Travers (in Westbury - Bellack 1971) is of the opinion that important relationships embedded in the didactical process cannot be found out through observational studies in natural school situations alone. He argues first that the various variables cannot be sufficiently controlled in live surroundings because they appear simultaneously and entwisted with each other. Travers' second argument is that the frequency of a certain phenomenon is not correlated with its importance for the process. Therefore such arrangements are needed that also rare events can be sufficiently recorded. Consequently, in Travers' opinion, laboratory environment is the most appropriate place for investigation of relationships within the instructional process and for testing hypotheses concerning these relationships.

A viewpoint on the other extreme is presented by Philip Jackson (1962) who critizes the way material for classroom research hitherto has been collected. Only periods of "ordinary" teaching and events comprising dialogues have been included in the sampling, with the result that the recordings available are not representative of the instructional process at large. The material on which classroom research has been based does not, according to Jackson, reflect the natural chain of events in school life. He argues especially that planning which precedes the instructional interaction has been wholly neglected in observational studies.

The controversy between Travers and Jackson is, however, only superficial. Strategically it is a question of timing, of deciding what procedure is to be preferred during the first phase of research and what later on. Within the DPA Helsinki we have used natural, unbroken chains of instructional situations as material, because no single situation is independent of what has happened before it and what has been

planned to follow it. Descriptions based on observational studies in live situations must of course also be completed by detailed analyses in artificially modelled laboratory settings or in situations which have been structured by certain managements.

In the DPA Helsinki project we have made use of only one intrusion of this kind. We have included the joint planning element in the otherwise conventional instructional process. More in this direction can be done but, as we see it, not before a general picture with no contradictory elements exists.

In planning the second, post-taxonomical phase of DPA Helsinki two main methodological problems have emerged. The first one is connected with the statement that instruction (at least during one school day) proceeds - or ought to proceed - as a continuous chain of situations which is balanced in some way or another. As common and acceptable as this statement may be, the sampling procedure used for observational recordings has mostly left it unregarded: temporal sections which have been sampled from the instructional process are quite isolated ones. The reasons for this are in many cases apparent: observed periods have been restricted to one subject-matter area only. But even here the researcher has taken very little interest in relationships within the chain of lessons.

Secondly, if purposefulness of instruction is to be taken into account the question emerges how variables representing goal-oriented behavior are to be operationalized. Educational objectives to be strived at in the classroom are in Finland expressed in documents containing curricula on the national and local level. Expected teacher and pupil behaviors as well as end products in learning are in these documents usually defined and described in a way that does not facilitate teachers' decisions in choosing certain actions and evaluating corresponding results. In making plans for the next day's or week's instruction the teacher hardly finds much support in the above mentioned documents. Greater influence probably comes from textbooks and other learning materials.

What is really the role of these documents and materials in the daily planning (during the preactive phase of instruction, as Jackson calls it)? If they play a rather unimportant role, where are then the intentions and aims needed to guide the instruction as a purposeful process coming from? The methodological problem to be solved here is, consequently, how can goal-orientedness be uncovered and operationalized for empirical investigation.

Manipulating the instruction in such a way that planning is separated from the ordinary flow of teaching-learning situations offers a solution. During a joint planning session the teacher, using a previously made sketch, discusses with his/her pupils what and how and also why to study tomorrow (or during the next week). Decisions which refer to a curriculum in the real meaning of this term are made and distributed to all participants in written form. It is apparent that after such planning activity there exists, at least in the minds of many pupils, some purposefulness which appears as goal-related behavior when these plans are realized.

"To manipulate" is an appropriate expression, because it certainly is artificial to separate, on one hand, planning and, on the other hand, realization of the plan. Some planning activity always goes on even during the instructional process proper. But purposefulness cannot be directly observed, and that's why goal-related behavior must be operationalized in an indirect way, e.g., by collecting data concerning pupils' views on the joint plan during the process itself. Another possibility is to make interpretative conclusions on the basis of findings of initial recordings from the planning session and the session where the results of planned work are discussed.

When goal variables are to be included in the research paradigm of the DPA Helsinki, the target phenomenon of our investigations will more clearly be a continuous, pre-planned chain of instructional situations. On this basis it seems

possible to take up a problem area which has been too little investigated; relationships between the officially stated and the real, live curriculum.

5.2. Aims and Paradigm

As to the aims of the DPA Helsinki we are trying

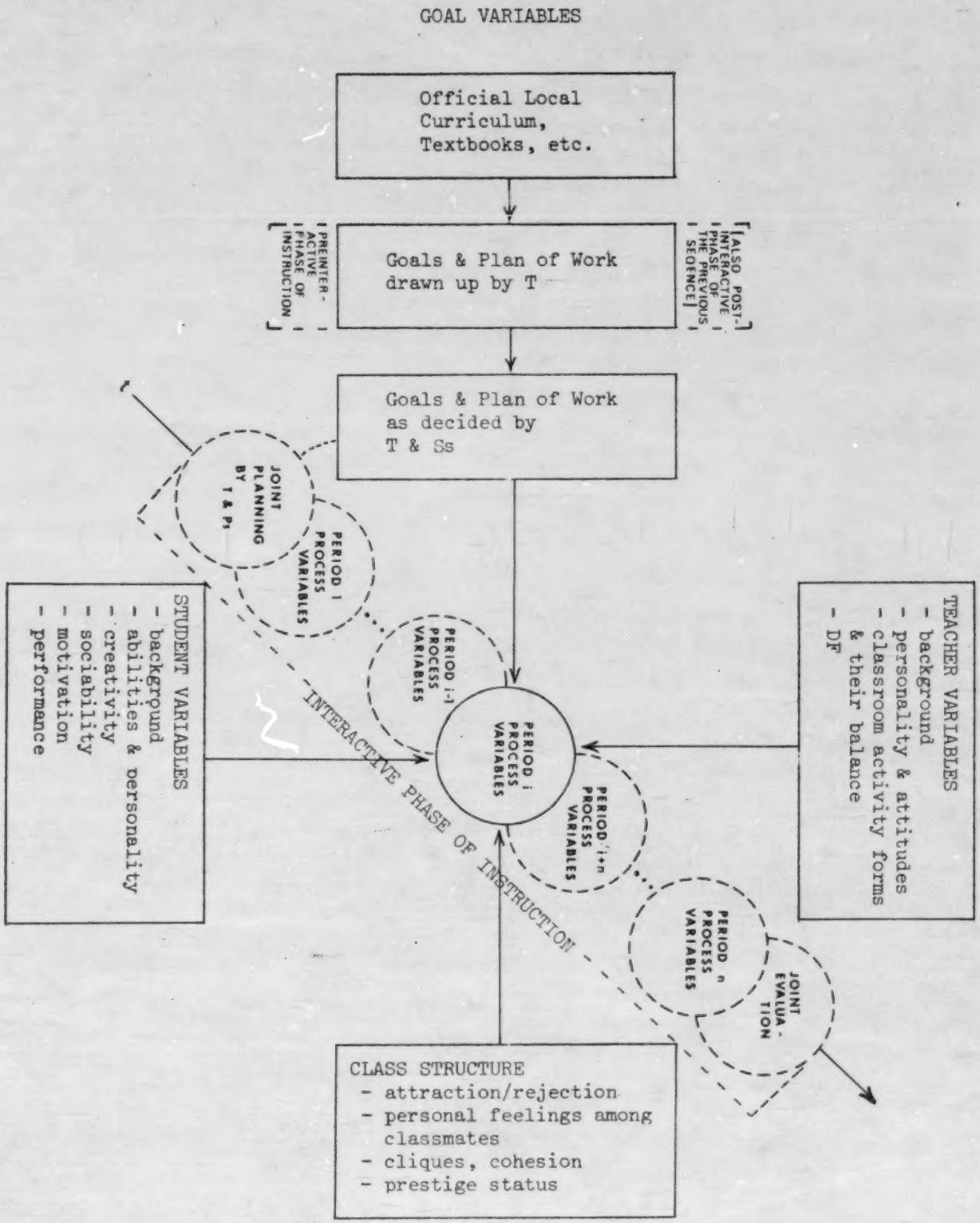
first, to describe continuous and holistic chains of instructional situations consisting of preinteractive, interactive and postinteractive phases, and to search for invariances both within instructional periods and between periods following each other,

second, to understand and explain instructional processes in terms of persons participating in the interaction and on the basis of certain groups of background variables, assumed to be relatively constant during the process, and comprising teacher, student, social structure, and goal variables,

third, to clarify the extent to which educational objectives, stated in the official curriculum and determined during the preinteractive phase of instruction and joint planning appearand are realized in the interactive process.

Instructional processes proceed in a setting of certain background variables, some of which are continuously "present" during the interaction and directly connected with it, and some with connections of more indirect nature. In the latter composition of the school unit, its climate, and relations with the parents may be mentioned.

Four groups of background variables are included in the paradigm of the DPA Helsinki (see p. 30), all assumed to be needed in order to understand the instructional interaction. These variables have been operationalized in the following way, to make it possible to consider the relationship between them and the process variables as a meaningful whole and to explain this whole.


GOAL VARIABLES
Official Local Curriculum, Textbooks, etc.
Goals & Plan of Work drawn up by T
[PREINTERACTIVE PHASE OF INSTRUCTION]
[ALSO POST-INTERACTIVE PHASE OF THE PREVIOUS SEQENCE]
Goals & Plan of Work as decided by T & Ss
JOINT PLANNING BY T & Ps
PERIOD 1 PROCESS VARIABLES
PERIOD i-1 PROCESS VARIABLES
PERIOD i PROCESS VARIABLES
PERIOD i+n PROCESS VARIABLES
PERIOD n PROCESS VARIABLES
JOINT EVALUATION
INTERACTIVE PHASE OF INSTRUCTION
STUDENT VARIABLES
- background
- abilities & personality
- creativity
- sociability
- motivation
- performance
TEACHER VARIABLES
- background
- personality & attitudes
- classroom activity forms & their balance
- DF
CLASS STRUCTURE
- attraction/rejection
- personal feelings among classmates
- cliques, cohesion
- prestige status

1. Student variables include ability, personality, creativity, sociability, motivation, home background, and achievement.
2. Social structure variables include attraction/rejection, distribution of attraction, personal feelings toward classmates, clique formation, class cohesion, and prestige status.
3. Teacher variables comprise biographical data, dome aspects of personality and temperament, attitudes, opinions of teaching profession, and quality of teaching.
4. Goal variables include goals and plan by the teacher during preinteractive and postinteractive phases, goals and plan during the joint planning and the joint evaluation.

Background variables with less direct connection with the instructional process proper represent the educational environment at large. They are to be taken into account by using qualitative descriptions of schools as units: personal relations, climate, and physical facilities. No operationalization is to be carried out in this area.

Also with regard to the first-mentioned group of background variables a kind of "soft" strategy instead of a "hard" or experimental one is to be used. The reason for this is not that only part of these variables can be properly quantified or even scalarized, nor the fact that the investigation is restricted to a minor number (about six) of classrooms, but strategically, as we see it, it cannot be prudent at this stage of interaction analysis to strive at generalizable descriptions of instructional processes in settings comprising certain background variables. Knowledge of the conditions upon which the existence of a human being or a group of human beings is based cannot be generalized to knowledge of the conditions of another person or group (cf., for example, Trankell 1973, 376). But, as Trankell argues, such a knowledge makes the researcher more competent to understand human conditions at large.

Consequently, only on the presumption that instructional processes in certain concrete settings are understood in terms of persons living and acting in these surroundings, and that as a result a picture with minimal controversy, i.e., an internally valid picture emerges, we are able to proceed further, to look for inter-class generalizations.

References

Bales, R. F. 1950. Interaction Process Analysis: A Method for the Study of Small Groups. Reading, Mass.: Addison & Wesley.

Bellack, A. A. & Davitz, J. R. 1963. The Language of the Classroom. Meanings Communicated in High School Teaching. New York: Institute of Psychological Research, Teachers College, Columbia University.

Bellack, A. A. & Kliebard, H. & al. 1966. The Language of the Classroom. New York: Teachers College Press.

Cooley, W. W. & Lohnes, P. R. 1971. Multivariate Data Analysis. New York: John Wiley & Sons.

Flanders, N. A. 1960. Teacher Influence, Pupil Attitudes, and Achievement. U.S. Department of Health, Education, and Welfare. Office of Education, Cooperative Research Project No. 397. Washington, DC.

Flanders, N. A. 1970. Analyzing Teaching Behavior. Reading, Mass.: Addison & Wesley.

Furst, N. 1967a. The Multiple Languages of the Classroom: A Further Analysis and a Synthesis of Meanings Communicated in High School Teaching. Unpublished doctoral thesis, Temple University.

Furst, N. 1967b. "The Multiple Languages of the Classroom." Paper read at American Educational Research Association: New York.

Hoetker, W. J. 1968. "Bellack's 'Rules of the Classroom Language Game': A Replication." The Journal of Educational Research 9, 400.

Hoetker, W. J. & Ahlbrand, W. P., Jr. 1969. "The Persistence of the Recitation." American Educational Research Journal 6, 145-167.

Jackson, P. W. 1962. "The Way Teaching Is." In: Contemprary Thought on Teaching (Ed. Hyman, R. T.). New Jersey: Prentice-Hall, 6-12.

Karma, K. 1972. Investigations into the Instructional Process. V. Experiences with the Bellack Classification System. Research Bulletin, Institute of Education, University of Helsinki, No. 30.

Komulainen, E. 1970. Investigations into the Instructional Process. II. Objectivity of Coding in a Modified Flanders Interaction Analysis. Research Bulletin, Institute of Education, University of Helsinki, No. 27.

Komulainen, E. 1973. Investigations into the Instructional Process. VIII. On the Problems of Variable Construction from Flanders' Interaction Matrix with Special Emphasis on the Stochastic Nature of Classroom Communication. Research Bulletin, Institute of Education, University of Helsinki, No. 34.

Koskenniemi, M. 1969. "Principles in Building a Research Model for Empirical Investigation of the Instructional Process." International Association for the Advancement of Educational Research, Warsaw Congress 1969, Section Meetings.

Koskenniemi, M. 1970. "Modele w badanich nad processem nauczania." Kwartalnik Pedagogiczny 15, 205-208.

Koskenniemi, M. 1971. "Prinzipien für die Entwicklung eines Forschungsmodelles für die empirische Untersuchung des Unterrichtsprozesses." Vergleichende Pädagogik 7, 401-405.

Koskenniemi, M. & al. 1965. The Development of Young Elementary School Teachers. Ann. Acad. Scient. Fenn. B. 138. Helsinki.

Koskenniemi, M. & Komulainen, E. & a.. 1969. Investigations into the Instructional Process. I. Some Methodological Problems. Research Bulletin, Institute of Education, University of Helsinki, No. 26.

Koskenniemi, M. & Hälinen, K. 1970. Didaktiikka. Helsinki: Otava.

McNemar, Q. 1962. Psychological Statistics, (3rd Ed.) New York: John Wiley & Sons.

Medley, D. M. & Hill, R. A. 1969. "Dimensions of Classroom Behavior Measured by Two Systems of Interaction Analysis." Educational Leadership 26, 821-824.

Mishler, E. G. & Waxler, N. E. 1968. Interaction in Families. New York: John Wiley & Sons.

Simon, A. & Boyer, E. G. (Eds.) 1967. Mirrors for Behavior: An Anthology of Classroom Observation Instruments. Vols. 1-6. Philadelphia: Research for Better Schools.

Simon, A. & Boyer, E. G. (Eds.) 1970a. Mirrors for Behavior: An Anthology of Classroom Observation Instruments. Vols. 7-14 and Summary. Philadelphia: Research for Better Schools.

Simon, A. & Boyer, E. G. (Eds.) 1970b. Mirrors for Behavior: An Anthology of Classroom Observation Instruments. Supplementary Vols. A and B. Philadelphia: Research for Better Schools.

Trankell, A. 1973. Kvarteret Flisan. Stockholm: Norstedt.

Westbury, I. & Bellack, A. A. (Eds.) 1971. Research into Classroom Processes. New York: Teachers College Press.

Wood, S. E. & Brown, B. B. & Ober, R. L. & Soar, R. S. 1969. "A Factor Analysis of Three Sets of Simultaneously Collected Observational Data." A paper read at American Educational Research Association: Los Angeles.

Previous issues of Investigations into the Instructional Process have been published in the series Research Bulletin, Institute of Education, University of Helsinki.

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